

A LARGE PARASUCHIAN (PHYTOSAUR) FROM THE UPPER TRIASSIC PORTION OF THE CULPEPER BASIN OF VIRGINIA (USA)

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Abstract.—Postcranial remains of a large parasuchian comparable to *Rutiodon manhattanensis* were recovered in an excavation at Dulles International Airport, Fairfax County, Virginia. While fragmentary, these remains represent the first parasuchian known from the Culpeper Basin and constitute the only tetrapod skeletal material reported from this basin; previous reptile records are based on footprints. The problems of taxonomic assignment of the known Newark parasuchian remains is briefly discussed.

Although the Culpeper Basin is one of the larger of the exposed Newark basins comprising the Newark Supergroup (Olsen, 1978), until recently it received relatively little attention except for the pioneering mapping done by Roberts (1928). In the last few years a number of papers have appeared on local problems within the basin but only a few have expanded on the lithostratigraphy and chronostratigraphy put forth by Roberts. Cornet *et al.* (1973) and Cornet (1977) established the existence of Jurassic (Liassic) age sediments toward the top of the basin's sequence; prior to this discovery the entire column was presumed to belong within the upper Triassic. These conclusions have been reinforced by similar interpretations of the Culpeper basin fish fauna by Schaeffer and McDonald (1978). Major changes in the basin lithostratigraphy have been proposed by Lee (1977), who has proposed a series of names for units in the basin quite different from those used (in part erroneously) by Roberts.

The remains described herein were excavated by D. H. Dunkle and R. E. Eggleton in 1959 from a drainage ditch due east of the south end of the main north-south runway at Dulles International Airport (Figure 1). On the presumption that about 30,000 stratigraphic feet of sediment are present in the basin, this locality lies about 5,000 stratigraphic feet (1,600 meters) above the base of the basin's column and about 15,000 stratigraphic feet (4,700 meters) below the lowest lava flow in the basin (which falls slightly above the Triassic-Jurassic systemic boundary [Cornet, 1977]). This places the specimen near the base of the Bull Run Shale as defined by Roberts and near the base of the Balls Bluff Siltstone as defined by Lee.

The Dulles specimen (USNM 22381) was found in a red calcareous mud-

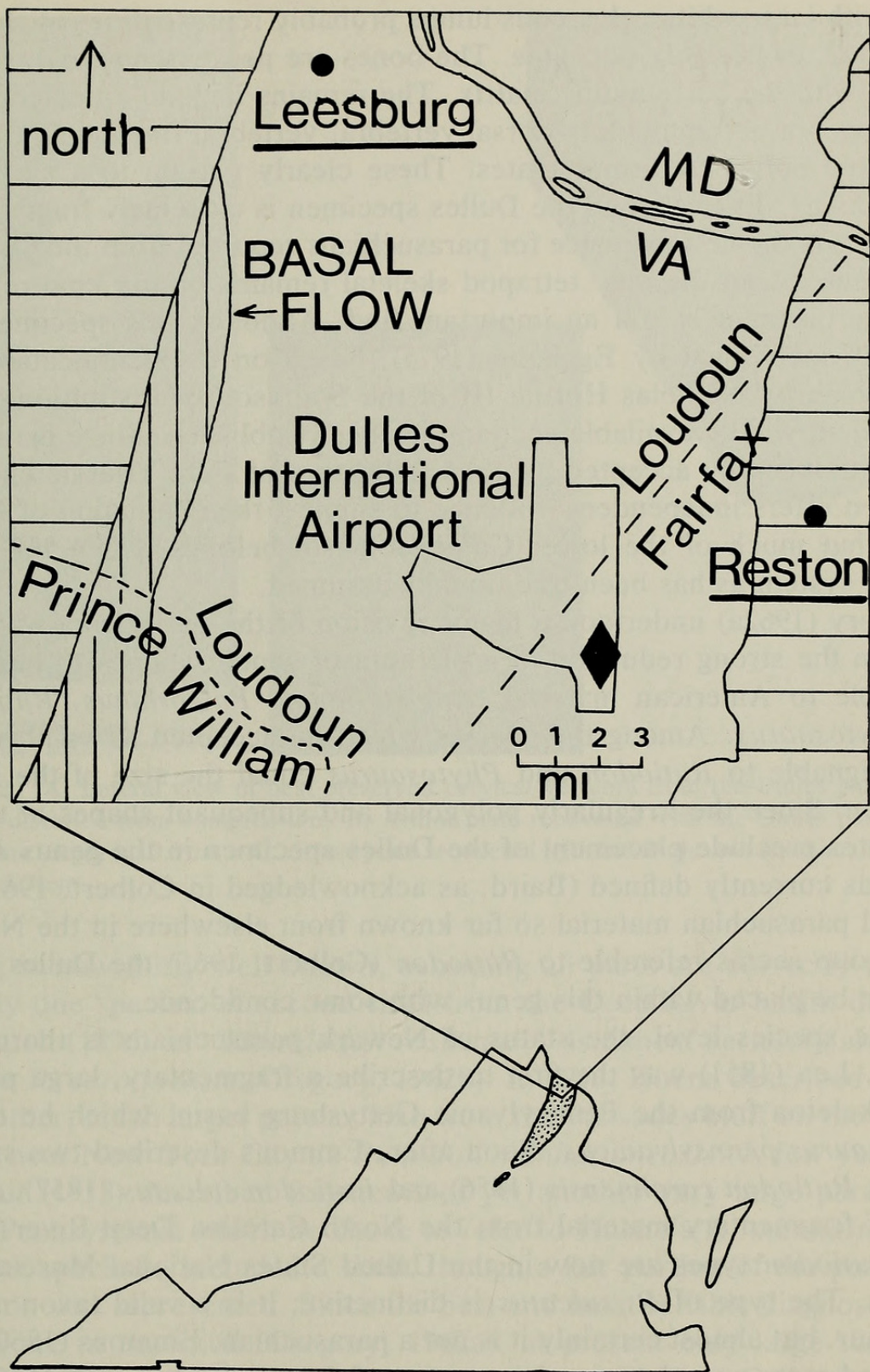


Fig. 1. Map showing location of Dulles International Airport and the area within it from which the parasuchian skeleton was recovered (black diamond). *Horizontal rule*—pre-Triassic metamorphic terrane; *vertical rule*—sediments of known Jurassic age lying above basal lava flow. Since basal flow is slightly above the Triassic-Jurassic boundary and the exact position of this boundary is not yet established, most but not all of the unruled area is of late Triassic age. Stippled region on Virginia base map is the approximate area underlain by the Culpeper basin.

stone with large white calcareous lumps probably representing caliche concentrations or possibly oncalites. The bones are nearly white and contrast sharply with the surrounding matrix. The remains include a posterior cervical vertebra, a fragmentary dorsal vertebra, vertebral fragments, rib fragments and polygonal armor plates. These clearly pertain to a very large parasuchian*. Even though the Dulles specimen is extremely fragmentary, because it is the first evidence for parasuchians reported from the Culpeper basin (and indeed the only tetrapod skeletal remains of any kind reported from the basin) it is still an important find. Although this specimen was passingly mentioned by Eggleton (1975), based on its identification as a parasuchian by Nicholas Hotton III of the Smithsonian Institution, so far no detailed, widely available account has been published. Since parasuchians are universally accepted as good indicators of Late Triassic age, this specimen offers independent evidence to support the contention of Cornet (1977) that much of the lower Culpeper basin belongs within the upper Triassic system as has been traditionally assumed.

Gregory (1962a) undertook a major revision of the parasuchia which resulted in the strong reduction of a plethora of generic names to only four applicable to American material: *Angistorhinus*, *Paleorhinus*, *Rutiodon*, and *Phytosaurus*. Among the species which he accepted as valid, only a few assignable to *Rutiodon* and *Phytosaurus* equal the size of the Dulles specimen. Since the irregularly polygonal and subequant shapes of the armor plates preclude placement of the Dulles specimen in the genus *Phytosaurus* as currently defined (Baird, as acknowledged in Colbert, 1965) and since all parasuchian material so far known from elsewhere in the Newark Supergroup seems referable to *Rutiodon* (Colbert, 1965) the Dulles specimen can be placed within this genus with some confidence.

At the species level, the status of Newark parasuchians is thoroughly unclear. Lea (1851) was the first to describe a fragmentary, large parasuchian skeleton from the Pennsylvania Gettysburg basin, which he named *Clepsysaurus pennsylvanicus*. Soon after, Emmons described two smaller species, *Rutiodon carolinensis* (1856) and *Rutiodon sulcatus* (1857), on the basis of fragmentary material from the North Carolina Deep River basin. Both *Rutiodon* types are now in the United States National Museum collections. The type of *R. sulcatus* is distinctive; it is a valid taxon and an archosaur, but almost certainly it is not a parasuchian. Emmons (1860) later described more complete cranial remains of *R. carolinensis* and McGregor (1906) described most of the postcranial skeleton based on bones from numerous individuals recovered in the type area. As a result of these papers, as well as Gregory's significant re-analysis of the skull (1962b), *R. caroli-*

* Parasuchians have commonly also been called phytosaurs, but the latter name recently has been considered less proper (Chatterjee, 1978).

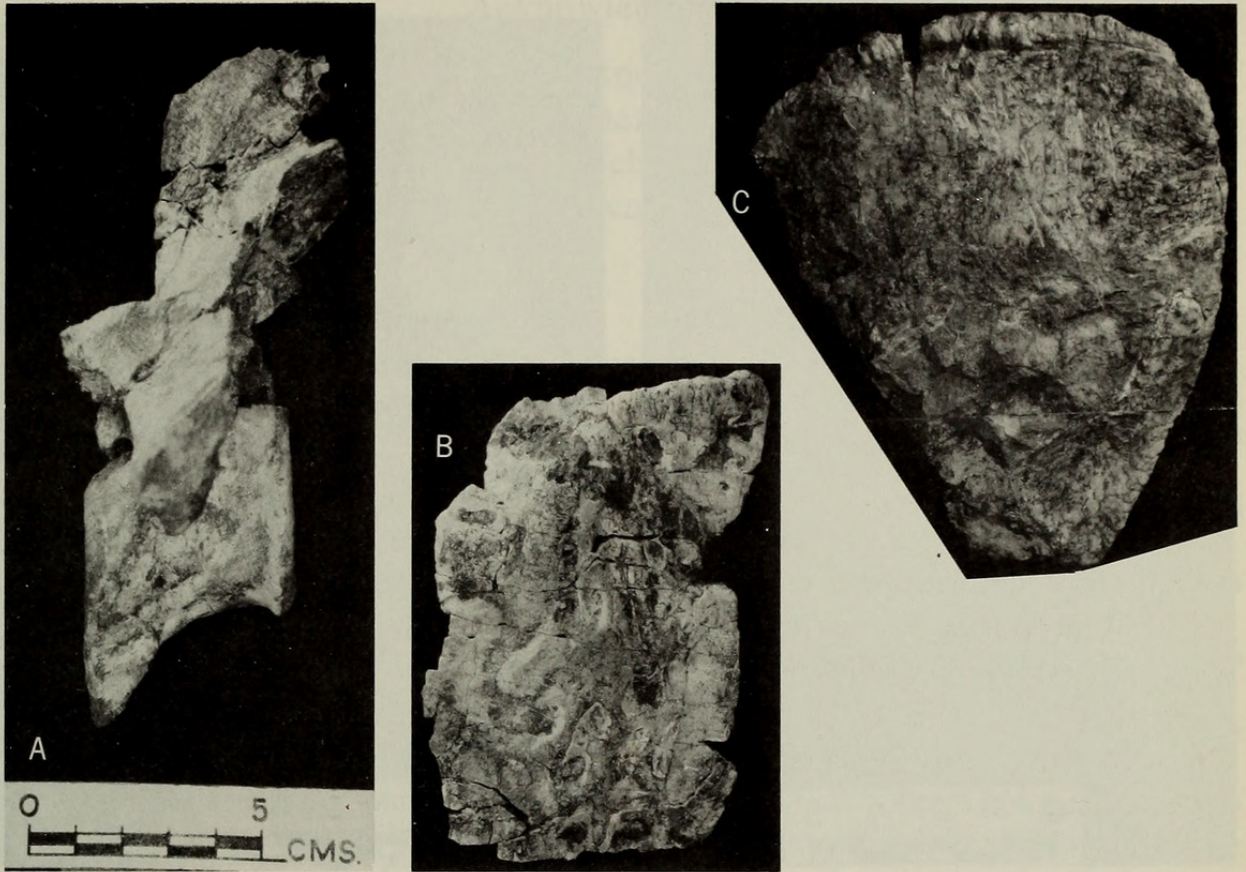


Fig. 2. A, Lateral view of best preserved cervical vertebra from the Dulles parasuchian, slightly distorted from compression; B, Armor plate recovered with the Dulles parasuchian. Maximum length is 10.5 cm.; C, Armor plate recovered with the Dulles parasuchian. Maximum length, 6.3 cm.

nensis is now fairly well known, assuming all parts are correctly assigned to only one species. A second skull from the Deep River basin, described by Marsh (1896) as "*Rhytidodon rostratus*," is almost certainly also referable to *R. carolinensis* (Gregory, 1962b). In 1913, Huene described remains of another, much larger parasuchian from the Palisades bluff on the Hudson River near New York City as *Rutiodon manhattanensis*. A few years later Sinclair (1918) described fragments of yet another very large parasuchian from Pennsylvania which he chose to refer to Huene's *R. manhattanensis*. Neither specimen included a skull, though a fair portion of the postcranial skeleton was represented. Since the best and most reliable diagnostic characters are in the skull (Gregory, 1962a), at present only large size really separates *R. manhattanensis* from *R. carolinensis*. Thus Colbert, when he described a small skull from the Lockatong Formation of New Jersey at Fort Lee (1965) was compelled to assign it to *Rutiodon carolinensis* (with which it is fully comparable) rather than to a young *R. manhattanensis* (for which the skull is unknown), while acknowledging the impossibility of making too firm a decision in view of how poorly *R. manhattanensis* is known.

Camp (1930) and Colbert and Chaffee (1941) accepted *Clepsysaurus penn-*

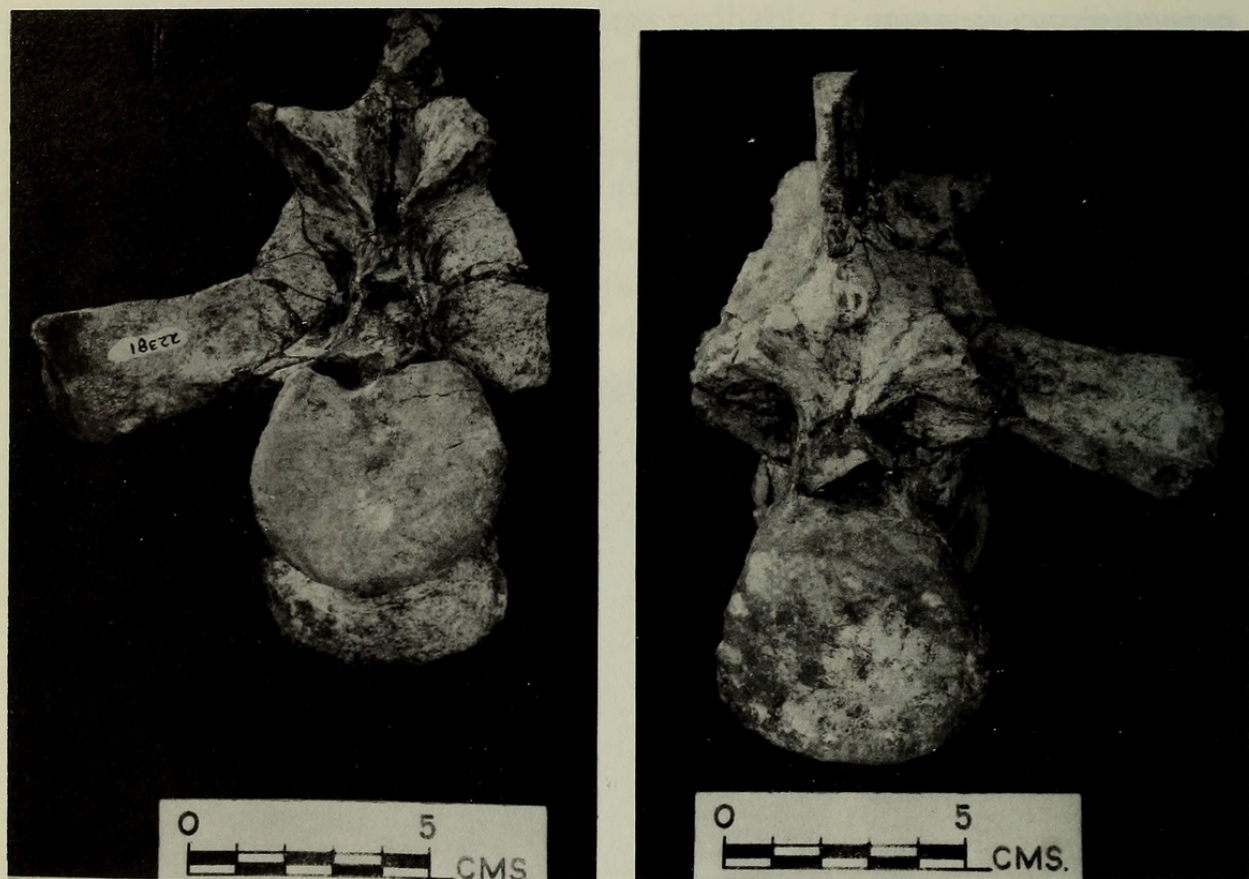


Fig. 3. (Left) Posterior view of the cervical figured in Fig. 2A; (Right) anterior view of the cervical figured in Fig. 2A.

sylvanicus as a valid species, but more recently the trend has been to synonymize it with *R. manhattanensis* which constitutes a much more diagnostic type (see Colbert [1965] for a thorough discussion of this problem). Thus *Clepsysaurus pennsylvanicus* has been relegated to the status of a *nomen dubium*. Yet even the validity of *Rutiodon manhattanensis* is none too certain. Only size presently distinguishes *R. manhattanensis* from *R. carolinensis*. It is entirely possible that some environmental bias in the Newark basins causes us to find only young or only old specimens of *Rutiodon* but not both together; perhaps *Rutiodon* was a swamp or lake dweller as a juvenile and an upland dweller as an adult (an idea partially developed by Gregory, 1962a, p. 688). If so, *R. manhattanensis* and *R. carolinensis* may really be only different age groups of the same species. Thus either one or two species of *Rutiodon* are known to be present in the Newark Supergroup, depending upon the preferences and biases of the worker. In view of the existence of this state of taxonomic ambiguity, no purpose would be served by firmly assigning the Dulles material to either existing species or to a new species. Though stratigraphically significant, it is best for now to assign this specimen to *Rutiodon cf. manhattanensis* until new and much more complete material from a number of the Newark basins permits a fresh and meaningful look at the intricacies of Newark parasuchian taxonomy.

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